

Radiometric Performance Assessment of the RapidEye Constellation_2010

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- Acknowledgments
- 2009 Vicarious Calibration Campaign Summary
- 2010 Verification Events
- Current Radiometric Accuracy Assessment
- 2011 Radiometric Calibration Activities

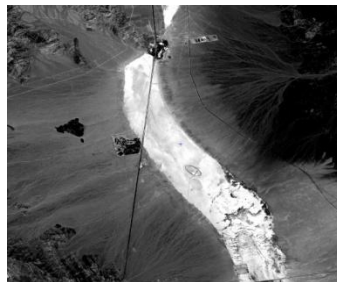
- Dr. Jeff Czapla-Myers and the members of the Remote Sensing Group, College of Optical Sciences, University of Arizona
- Dr. Brian D'Souza, Mr. Harald Konstanski, Mr. Michael Oxfort, Mr. Scott Douglass, Dr. Horst Weichelt, Mr. Cody Anderson, RapidEye AG

Reflectance based vicarious calibration campaign_ 2009 (1)

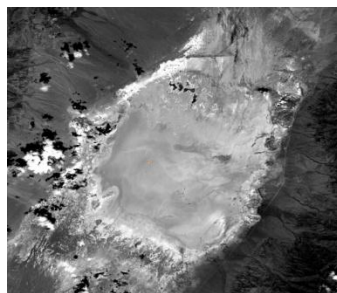
- Ten field events were conducted at Railroad Valley Playa and Ivanpah Playa by the Remote Sensing Group, College of Optical Sciences, University of Arizona in 2009-2010
- Simultaneous overpasses with RE3 and RE4 and opportunistic acquisitions with other sensors (RE2, RE5)
 - *RE1 not included in campaign due to operational priorities*
- Compare in-band measured at-sensor spectral reflectance to top-of-atmosphere (TOA) predicted values

Reflectance based vicarious calibration campaign_ 2009 (2)

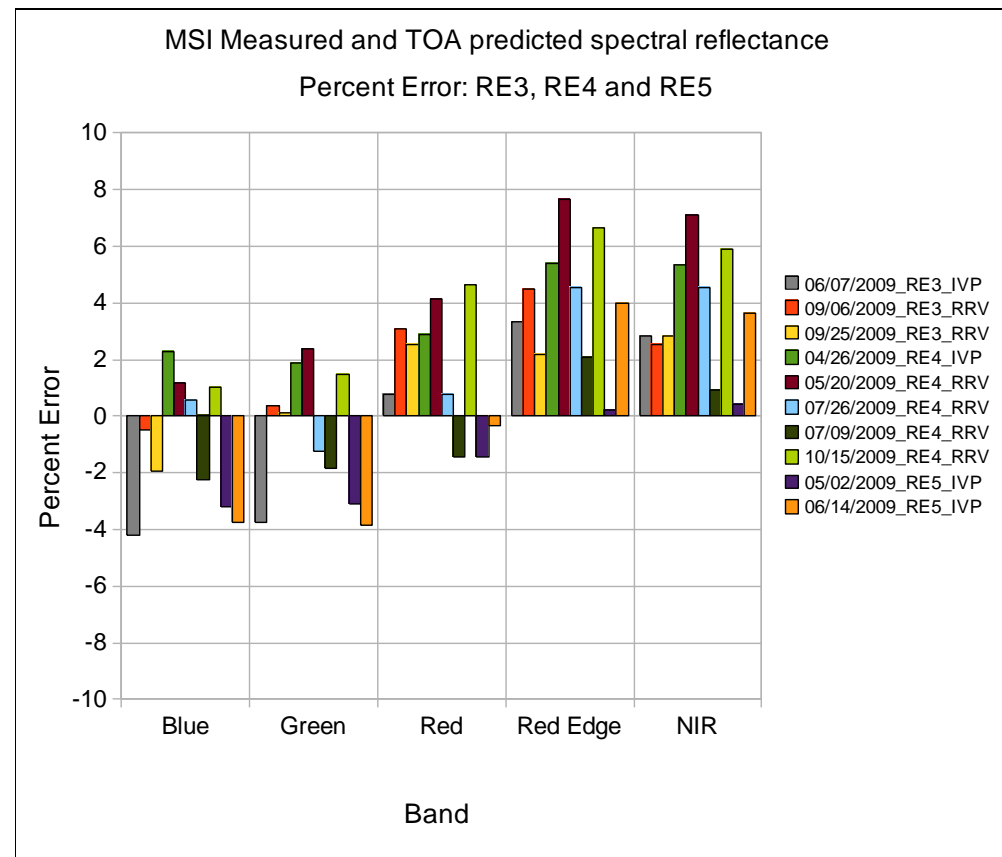
- **RapidEye sensor response was within 7.5% (worst case) of TOA predictions**



RE4_20 May_2009
Red-Edge Band_IVP Playa



RE3_07 June_2009
Red Band_RRV Playa

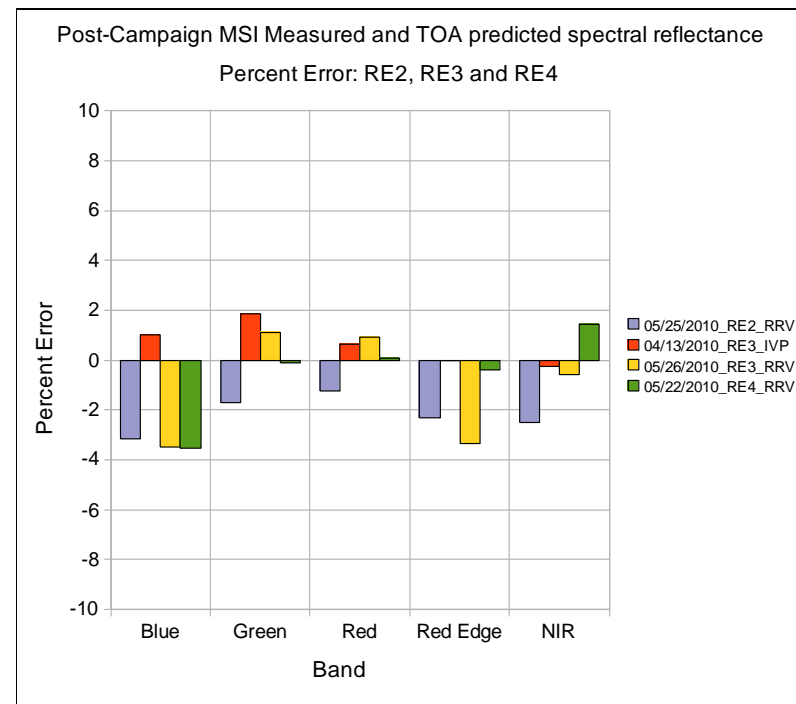


Reflectance based vicarious calibration campaign_ 2009 (3)

- Absolute calibration of RE3 and RE4 combined with relative radiometric calibration of the constellation (requirement for each sensor to be within +/- 2.5% of constellation baseline) transfers absolute radiometric uncertainty to each sensor
- 2009 results led to adjustment of ground segment processing parameters to improve the in-band response for each RapidEye sensor

Verification Events_2010 (1)

- Three post 2009 campaign verification events were conducted between April and May 2010
- RapidEye response was found to be within ~ 4% (worst case) of TOA predictions

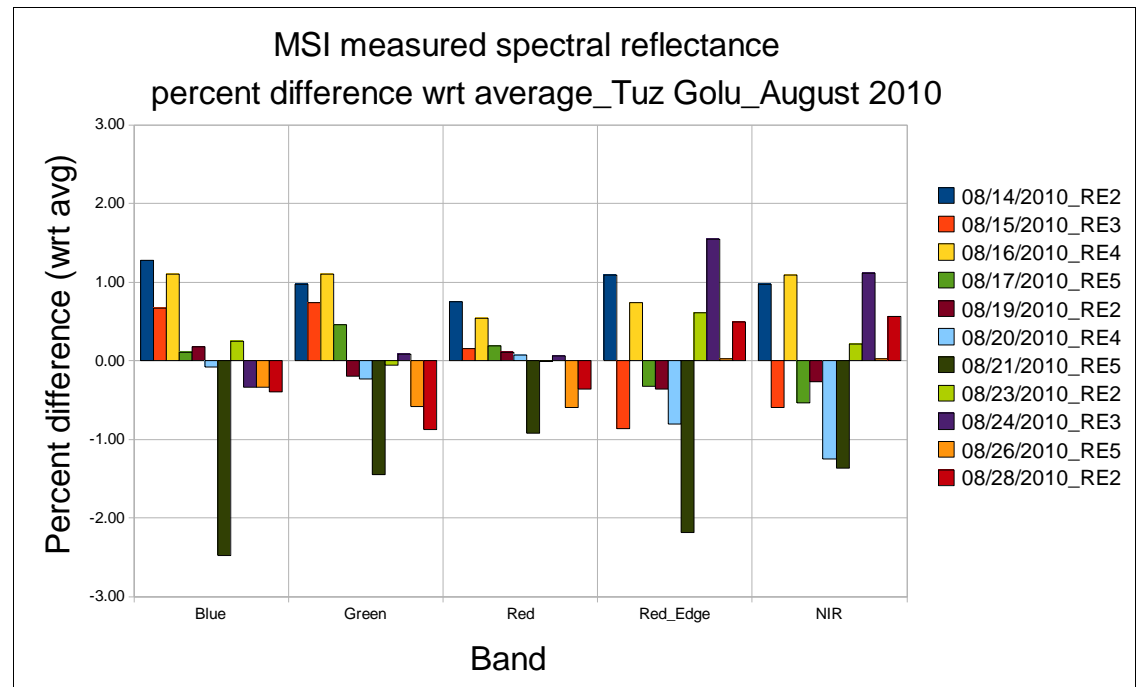


Verification Events_2010 (2)

- Relative radiometric response was assessed from images acquired using Tuz Golu calibration site in August as part of *CEOS Sensor Cal Event 2010**



RE5_17 August_2010
Red Band_Tuz Golu, Turkey



*<http://calvalportal.ceos.org>

Current Radiometric Assessment

- RapidEye sensors remained calibrated in an absolute sense to within ~4% of TOA predictions through August 2010
- Operational monitoring indicates that the sensors remain calibrated to within +/-2.5 % in a relative sense
 - *Confirmed by USGS in a separate 2010 study using RapidEye Level 3A Libya 4 image data*

- **Reflectance based vicarious calibration campaign with RSG using RRVP and IVPP**
 - *Two field events coupled with simultaneous overpasses for each sensor*
 - *Opportunistic acquisitions with other spacecraft around the dates of the field events (+/- 2 days)*
- **Comparison of RapidEye to Landsat**
 - *Ongoing study with USGS using N. Africa and Sonoran Desert sites*
- **Spatial Calibration Enhancement**
 - *Investigate feasibility of side-slither using multiple terrestrial sites and the moon*

Questions

Ajka, Hungary_October 2010



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